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EQUIVOCAL CONFIRMATION

By RUPERT CRAWSHAY-WILLIAMS

IN the course of an article on " Hypotheticals ",[1] Mr. David Pears explains, I think convincingly, the puzzle involved in the Paradox of Confirmation. Here is a brief reminder of how the puzzle arises, using Mr. Pears's example of a hypothetical as a starting point :

The general hypothetical " If anything is a raven it is black " (θ) is equivalent to " If anything is not black it is not a raven " and is also equivalent to "Anything is either not a raven or black ". Since these three statements are equivalent, what confirms any one of them confirms equally the others. Therefore the observation of a black raven (type 1 case), the observation of something not black which is not a raven (type 2 case), and the observation of anything at all which is not a not-black raven (type 3 case) are all equally confirmations of all three statements, and consequently of θ itself.

This is odd. For the type 1 observation seems obviously a better confirmation of θ than the two others. Yet, as Mr. Pears points out (p. 50), " it is at least an inevitable result of human myopia that θ cannot be completely verified, but only falsified. Why then," he asks, " is it unnatural to say that all situations which fail to falsify it confirm it equally ; and so that it applies both to things which are not black, and to anything at all? "

Mr. Pears explains this unnaturalness by showing that, when we apply a general statement to the practical purposes of living, we very sensibly grade the " confirmatory value " of a particular observation by relating this value to the probability of the observation's falsifying the statement. Thus, to illustrate very roughly, supposing that there are in fact some white ravens, and supposing that we allot ourselves a given finite number of observations, the chance of our seeing one of these white ravens is greater if we confine our observations to ravens (type 1 cases) than it is if our observations cover the much larger class of all things that are not black (type 2 cases) and this chance, in its turn, is greater than it would be if we decided to observe anything and everything (type 3 cases). In other words, for practical purposes we will count the observation " This is a raven and it is black " (type 1) as a " better " confirmation of " If anything is a raven it is black " than the observation " This is not black,

[1] ANALYSIS, 10. 3.

but it is not a raven" (type 2) and, *a fortiori*, than the observation "This at any rate isn't a white raven; it is a cocker spaniel", (type 3). But, as Mr. Pears says (p. 51), in doing this we adopt various assumptions (about the sizes of empirical classes) which are beyond the purview of the logician. So "the logician is professionally debarred from recognising the greater importance of type 1 cases". He has to say that all three types of observation are equal in confirmatory value, and then—as sometimes happens to logicians—he finds that he has said something which will outrage not only common sense but also his own finer feelings. On the one hand, the sight of a cocker spaniel seems obviously *not* a confirmation that all ravens are black; on the other hand it is equal in logical status to the sight of a black raven; and this *is* a confirmation. Therefore, the sight of a cocker spaniel is apparently both a confirmation and not a confirmation.

I want to suggest an alternative method of explaining this paradox, a method which is no more "correct" than Mr. Pears's but which has two fairly useful characteristics: in the first place it is, I think, a method which if applied generally to verbal paradoxes will usually help towards an explanation; in the second place, it should make the logician feel a little more comfortable.

In general we say that we have found a paradox when we discover that one train of thought leads to the conclusion that A is B and another train of thought (or, in a stricter sense of 'paradox', the same train of thought) leads to the conclusion that A is not B. Now, if A appears to be both B and not-B, one possible explanation is that some word is being used in two senses. For example, the word 'A' may refer to two different things one of which is B and the other of which is not; or it may be the word 'B' which is being used to refer to two different things; or both these words, or some other word used in the argument. This is sometimes an obvious explanation. Thus it is almost trivially applicable to such a paradox as Zeno's about the Many being numerically both finite and infinite, where the contradiction depends on Zeno's saying first, that there are as many things (sense 1) as there are, neither more nor less; and then that, if any two things are to be separate, a third thing (sense 2) must intervene between them. But the interesting thing about this explanation is that it is only obvious when it is obvious; that is to say it is the obvious explanation when, without reflection, we notice that some word or expression is being used in two senses, but it is far from obvious when we do not notice

this. For our " natural " tendency (i.e. what one might call our " mental set ") is to identify, rather than to distinguish between, the meanings of different tokens of (what would ordinarily be called) the same word (i.e. what would technically be called the same sign-type). So that, when two similar word-tokens seem *prima facie* to have the same meaning we have a sort of blind spot for the idea that a distinction of meaning may be relevant to the enquiry in hand. Consequently, when and if a paradox can be explained as a product of unnoticed equivocation between two senses of the same word, the chance of our spotting such an explanation is inversely proportional to the paradox's importance and puzzlingness.

If it is true (as I believe) that verbal paradoxes can in fact usually be explained as a product of equivocation,[1] this will often be especially so when it seems most obviously not so. I therefore suggest that in general we should begin any attempt to explain a paradox by looking for so-far unnoticed distinctions of meaning. Let us now see how this method applies to the paradox of confirmation.

We will take the general hypothetical " If anything is a raven it is black " (θ) as our example. Clearly the first distinction to be drawn is that between the analytic and the synthetic interpretations of θ. For the paradox of confirmation does not apply to statements which are true by convention. (This distinction is implicitly pointed out by Mr. Pears at the outset of his article, when he says that θ is to be regarded as spoken by someone who is prepared to face a counter-example). We concentrate, then, on θ interpretated as a synthetic statement ; and we begin to note distinctions between its various possible meanings, looking out for one which may be relevant to the present enquiry ; to put this more precisely, we begin to note the different propositions which may be expressed by different tokens of the sentence θ.

It would take too long to illustrate in full the kind of trial and error search which would in practice precede the finding of relevant distinctions. However, it is perhaps worth giving an example of a distinction which, though not itself relevant, suggests the kind of distinction we want.

θ can be interpreted :

(1) as a statement which is to be considered true or false although in practice untestable ; or

[1] Cf. " Heterology and Hierarchy " by Nathaniel Lawrence (ANALYSIS, 10.4). Mr. Lawrence shows, I think, that the Heterological paradox results from a fallacy which " viewed in one light . . . is that of equivocation " (p. 84).

(2) as an assertion which is not to be considered "correct" (in the sense of "corresponding with fact" and "genuine" or "meaningful") *unless* it is testable.

Given interpretation (1) θ is true if all ravens are black (and, of course, if there are no ravens). Given interpretation (2) θ is not correct unless there is some empirical evidence in its favour —unless, in other words, it is a valid (or rational, or sensible)[1] induction from observation not necessarily only of black ravens but also (permissibly) of such things as causal connections between the physical characteristics of black feathers and other physical characteristics of ravens.

Now, although this distinction is irrelevant to our present enquiry, it does demonstrate that the way in which we "confirm" θ will sometimes depend upon the way in which we interpret θ. And, if we remember this while at the same time remembering that the rules and rigours of logic are mixed up in the whole business, we have a pointer to what is, I think, the distinction we are looking for.

This distinction can best be marked as follows:

Let us suppose that somebody who utters θ (or some equivalent sentence) as an empirical and potentially confirmable statement is asked exactly what he means. He may say either—

(A) "I mean that all ravens are black; and when I say 'all' I *mean* all. It is not the case, for instance, that all except one of the ravens in the universe are black". (Note that the observation of a not-black raven will falsify this statement.) Or—

(B) "I mean that all ravens are black; though when I say 'all' I don't mean *all*. I suppose there may be one or two white ravens somewhere. But that isn't the point. It's somewhat as if I were to tell a child that all wasps have stings. What I mean is that it is rational (or, if you like sensible) to act on the assumption that any ravens you meet will be black, but don't blame me if one or two turn out to be white". (Note that the observation of a not-black raven will *not* falsify, i.e. will not invalidate, this statement).

I think it is an empirical fact that, in practice, people often do intend their general statements about the world to be interpreted on some such lines as those I suggest in (B). Indeed I think they more often mean (B) than they mean (A), except when they are logicians talking as logicians.

[1] These multiple qualifications are attempts to suggest what I mean without begging questions of definition.

This is important. For logicians quite often talk as ordinary men ; and therefore they are habituated to using general statements with both the (A) interpretation and the (B) interpretation. Given the natural tendency to identify the meanings of all instances of the same word or expression (in this case θ), the consequence is that logicians will tend to assume that θ is so to speak *one* statement-type, instead of being—for this purpose—the sign for two statement-types. What is more, they will regard the characteristics of statement-type (A) together with the characteristics of statement-type (B) as "the" characteristics of this (assumed) single statement-type θ.

Herein is conceived the contradiction and the paradox. For what is a confirmation of (B) will not be a confirmation of (A).

Clearly, everything that Mr. Pears says about the relative importance of type 1, 2 and 3 cases can be applied to θ (B) ; that is to say, it applies when a general statement is interpreted as a "rule"[1]—as a useful regulator of expectation or of behaviour. If, for instance, I adopt the rule of expectation " The ravens I see will be black ", I will count every observation of a black raven as a confirmation of the rule's usefulness, in the sense that it strengthens (renders more firm) my confidence in it, (partly of course because I am treating each observation as one of a series of observations). But I will not count the observation of a cocker spaniel as a confirmation. Moreover, the observation of a not-black raven does not invalidate the rule, but merely weakens my confidence in it.

The significant point here is that the observation of a black raven is not only normally but also appropriately (and therefore in a sense correctly) called a " confirmation " of θ (B). It is for this reason that we treat the observation of a black raven as a confirmation of θ (unspecified). But I think it is a bad reason. We are here regarding a characteristic peculiar to θ (B) as a characteristic of the (presumed) single statement-type θ ; and then, because θ (A) is also so to speak a part of θ (unspecified), we assume that this characteristic of θ (B) must also be a characteristic of θ (A). But I do not think that it is ; that is to say I do not think that the observation of a black raven is a confirmation of θ (A) in the same sense that it is a confirmation

[1] This is to use the word ' rule ' in a broader sense (expressing a looser injunction) than as Mr. Pears uses it (on p. 60) in discussing the reasons for calling hypotheticals ' rules '. It suggests incidentally that, at any rate in the broader sense of ' rule ', hypotheticals—as a class—cannot be called either rules or not rules. Any one hypothetical is (i.e. can be described as) a rule when it is *used* as such ; and a hypothetical is not a rule when it is not used as such. But this is a point which cannot be amplified in a short space.

of θ(B). And, if this is so, we have another case of potential equivocation between two senses of a single word.[1]

Let us examine θ(A). Its distinctive feature is that it is an unqualified statement about all ravens, without exception. Therefore it cannot be known to be true until we have examined all the ravens in the (assumed finite) universe. In other words, there is only one situation in which the observation of a black raven could verify θ(A) : namely, after we had examined all but one of the ravens in the universe and found that they were black. In any other situation—that is to say in general—the observation of a black raven is not a verification of θ(A). Let us use the shorthand expression " OBR " for any observation of a black raven which is not the final (completing and verifying) observation. OBR then does not verify θ(A). In that case, what does it do? If it shows neither that θ(A) is true nor that it is false, is there something else it can show—something that we could perhaps call "confirmation" (remembering of course how we have already decided to use the word ' confirmation ' in connection with θ(B). ? Clearly, no—since θ(A) is an unqualified statement about all ravens without exception. Of course, OBR can help to show that all ravens are probably black or that most ravens are black or that it is rational to judge that all ravens are black and so on. But, in all such cases, we are talking either about θ(B) or about the statement " It is probable that θ(A)"; we are not talking about θ(A) unqualified.

This leaves us, I think, with two alternatives :

(1) Either we define 'confirmation' as equivalent to "complete confirmation" or "verification", in which case OBR does not confirm θ(A),

(2) Or we define ' confirmation ' as something different from and short of complete confirmation, that is to say in such a way as to allow *graded* confirmation, based upon some means of assessing it in terms of probabilities or credibilities ; in which case, again, OBR does not confirm θ(A), though it can confirm θ(B).

To put this another way. Either we define ' confirmation ' so as to allow for and to specify a distinction between "complete confirmation" and "confirmation" or we do not. In either case, OBR is not a confirmation of θ(A). However, if we do specify a distinction between "complete confirmation" and "confirma-

[1] In a discussion of " Hempel's Paradoxes of Confirmation " (*Mind*, Vol. LIV, pp. 156–8), Mr. C. H. Whitely concludes, I think correctly (and consistently with what I am advocating) : " The relation of being-evidence-for a general hypothesis is of a different kind from being-an-instance-of or being-consistent-with such a hypothesis, and is not to be dealt with on the same lines . . . "

tion" (as opposed to a distinction between "complete confirmation" and "dis-confirmation"), we can do so only by adopting the notion of graded confirmation ; and, once we have done this, we have of course allowed for graded distinctions between the confirmatory values of type 1, 2 and 3 observations. In short, either we define ' confirmation ' so that no graded confirmation is possible, in which case there is no paradox ; or we define ' confirmation ' so that graded confirmation is logically implied, in which case, again, there is no paradox. It is only when we define ' confirmation ' in both these ways and then equivocate between them that we get a contradiction.

There is, however, one more point. If we cannot call OBR a confirmation of θ (A) while at the same time calling it a confirmation of θ (B), what *shall* we call it?

The observation of a not-black raven is of course a disconfirmation of θ (A). In this respect OBR is certainly to be distinguished from the observation of a not-black raven ; and if the latter is a disconfirmation, the former could perhaps appropriately be called a non-disconfirmation—or perhaps a neuter? If so, the observation of a white dove will also be a non-disconfirmation ; and of course the observation of anything at all except a not-black raven will equally be a non-disconfirmation. In short, all observations—except observations of not-black ravens—are equally non-disconfirmations of θ (A). It is therefore perfectly correct to say that type 1, 2 and 3 cases are all on an equal footing as applied to θ (A). But, since we are not logically compelled to define a non-disconfirmation as a confirmation, we are not thereby forced to the awkward conclusion that they are all equally *confirmations*. This should, as I suggested at the beginning of this article, make the logician feel more comfortable. He can claim that it is quite logical and quite natural to say that all situations which fail to falsify θ (A) fail equally to falsify it ; and also to say that some situations which fail to falsify θ (B) confirm it more than others. But he can safely deny that it is either natural or correct to say that all situations which fail to falsify θ confirm it equally.

Portmeirion, Merioneth,
N. Wales.

TENSE USAGE AND PROPOSITIONS

By JONATHAN COHEN

I WISH to suggest an analysis of sentences in a determinate tense which will avoid the disadvantages apparent in the analyses that I have seen published hitherto. These fall into three groups :—

i. Professor G. E. Moore,[1] Mr. C. H. Langford,[2] Lord Russell,[3] Professor Hans Reichenbach[4] and Mr. A. E. Duncan-Jones[5] hold that the meaning of propositions which sentences like " Brutus killed Caesar " are used to state is given by an analysans like " For some *t*, Brutus kills Caesar at *t*, and *t* is before now," provided that the present tense of the analysans is assumed to have no temporal reference. On this view " now " in the analysans is the proper name of a moment ; and consequently the analysis conflicts, as Mr. Duncan-Jones has pointed out, with the custom that historians who utter the sentence " Brutus killed Caesar " on different occasions are taken to agree with one another and thus to be asserting the same proposition.

ii. Mr. B. Mayo[6] holds that sentences in, say, the past tense, like " Brutus killed Caesar ", do two different jobs. They assert a fact ; and they record its pastness. The time-reference of its tense is irrelevant to the " fact-stating " feature of such a sentence, and merely " indicates that the record is posterior to the event ". " It doesn't assert anything . . . It dates the record ". But I am not quite clear about the implications of this theory. There seem to be three main possibilities :

A. Although this distinction between the " fact-stating " and " time-indicating " features of a sentence in a determinate tense may be illuminating in other respects, it is misleading if it suggests to anyone (although Mr. Mayo does not make this suggestion explicitly) that the latter feature cannot be used as an assertion of what is true or false, and therefore that agreement or disagreement with, say, a past tense utterance can only be agreement or disagreement about the " fact " asserted and cannot be concerned at all with the " time " indicated. For instance, if Mr. X says to me to-day (May 16, 1950) in the course of a conversation about world politics " The hydrogen-bomb was

[1] *Proceedings of the Aristotelian Society*. Supplementary Vol. VII (1927), p. 185.
[2] *Symbolic Logic*, C. I. Lewis and C. H. Langford, 1932, p. 315.
[3] *Inquiry into Meaning and Truth*, 1940, p. 108.
[4] *Elements of Symbolic Logic*, 1948, pp. 287, 288.
[5] ANALYSIS, Vol. 10, No. 1 (October, 1947), pp. 21–23.
[6] ANALYSIS, Vol. 10, No. 5 (April, 1950), p. 109 ff.

exploded by mistake", I might want to disagree with the "indication" that the bomb has already been exploded, without denying the "fact" that it may one day be exploded. I should probably say "The hydrogen-bomb has not yet been exploded at all", using the perfect tense to emphasise my disagreement about the appropriate temporal indication.

B. On the other hand, if Mr. Mayo's theory does allow the possibility of agreement or disagreement about the time "indicated", this time is on his theory presumably the date of Mr. X's record. But I think it could only be a Looking-Glass-World creature who might say that I was disagreeing with Mr. X about the dating of his record. We both know its date perfectly well, *viz.* May 16, 1950; and we are in complete agreement about this date. What I am disagreeing with him about is the dating of the hydrogen-bomb explosion relative to the date of his record.

C. Finally, if Mr. Mayo's theory does (as it should) allow the possibility that agreement or disagreement with the utterance is agreement or disagreement about the dating of the fact stated, his distinction between "fact-stating" and "time-indicating" does nothing to differentiate it from the theory of Professor G. E. Moore and the others mentioned in (i) above. And it is then open to Mr. Duncan-Jones' objection. An example will perhaps bring out the force of this objection. Mr. Y might say next week (May 23, 1950) "Yes, the hydrogen-bomb was exploded by mistake"; and, if he were commenting on the views of Mr. X and said nothing else in this connection, he would be taken to be agreeing with him, both about the "fact" stated and also about the time "indicated", *viz.* a date prior to May 16, not one merely prior to May 23. But this excludes any date between May 16 and May 23 and so it conflicts with the theory that past tense utterances merely "indicate" a time prior to that at which they themselves occur.

iii. Mr. P. Nowell Smith[1] treats this problem as a special case of the problem presented by all token-reflexive sentences; and he objects not so much to the details of the orthodox Moore-Russell analysis, as to any attempt to carry out such an analysis for token-reflexive sentences. He holds that "paradoxes must arise from trying to make the context of a sentence explicit in the sentence itself", and that these paradoxes are "of the same family as those which the theory of types is designed to solve". Moreover, to ask what a token-reflexive sentence means is "to ask an incomplete question". We must ask what it

[1] ANALYSIS, Vol. 10, No. 5 (April, 1950), p. 100 ff.

means "to a particular recipient on a particular occasion". Such sentences "have no meaning in isolation". If I understand him correctly, Mr. Nowell Smith concludes that, although we can always replace any token-reflexive *token* by a non-token-reflexive equivalent, we should not seek to discover analysing equivalents for token-reflexive *types*. But this view seems to me to be open to three fatal objections:

A. It is possible to produce an analysans which does not give rise to the paradox pointed out by Mr. Duncan-Jones, as I shall try to show below.

B. The paradox which arises from the usual improper analysis is not of the same family as those which the theory of types is designed to solve. It is a peculiarity of all token-reflexive sentences like "I am brown-eyed" that when we *mention* one we can only specify or entertain an incomplete proposition,[1] since no particular individual is said to be brown-eyed, whereas when we use the sentence in an appropriate context we assert a complete proposition in virtue of the very fact that we are so using it. (If, on the other hand, we wish to specify or entertain the complete proposition, or to include the incomplete one in an assertion, we must write or utter a non-token-reflexive sentence, e.g. "Cohen is brown-eyed" or "If any person is brown-eyed, etc.," respectively). It follows that both the analysans and the analysandum of a type of token-reflexive sentence-usage will express incomplete propositions, since in analysing a sentence we mention but do not use it. Accordingly, no type fallacy can occur in the process of analysis since, so far from completing an incomplete proposition improperly, which is the way in which the relevant logical paradoxes arise, the process of analysis actually entails rendering the proposition expressed incomplete. Moreover, when we use either the analysans or analysandum it is the context of its use which completes the proposition expressed, and this is no more type fallacious in the case of "For some t, Brutus kills Caesar at t and t is before now" than it is in the case of "I am brown-eyed".[2] Mr. Nowell Smith's mistake arises, I think, from using the word "sentence" first for "sentence-token" and then for "sentence-type" when he talks about making

[1] Some may prefer to use the word "proposition" in such a way that "incomplete proposition" is a contradictio in adjecto. But in the way in which I am here using the word we can say, for instance, that all propositional functions and many aposiopesis in the indicative mood involve the use of a sentence to express an incomplete proposition.

[2] I have dealt elsewhere (in *Mind*, Vol. 59, No. 233, of January 1950, p. 85) with the paradoxes that seem to arise from statements like "I am not speaking".

"the context of a sentence explicit in the sentence itself"[1] He seems to believe that he is talking about self-referent sentence-types, which might indeed give rise to logical paradoxes like those which the theory of types is designed to solve (e.g. "No-one uses a preposition to end an English sentence with"). But what he should be talking about are token-referent sentence-types, and if properly analysed these no more lead to paradoxes than do mirror-types.

C. If we can be told what a token-reflexive sentence means "to a particular recipient on a particular occasion", there may well be some general principles according to which this information is forthcoming. It is for these general principles that we ask when we seek an analysis of a token-reflexive sentence-type. Mr. Nowell Smith wrongly holds such a search to be a "philosophical mistake", because he wrongly believes that a token-reflexive sentence-type can have no meaning at all outside a particular context in which it is used. Anyone who has ever understood any token-reflexive sentence-type mentioned (but not used) by a grammarian, lexicographer or logician knows that this belief is an error for the usual broad variety of senses of the word "meaning". Moreover, it is an error of a kind which has unfortunately been all too common in analytical philosophy. It can be defended only by putting an unusually narrow interpretation on the word "meaning" and excusing this eccentricity on the ground that it draws attention to a difference of logical form. Mr. Nowell Smith is prepared to allow meaningfulness to token-reflexive sentence-types when *used* for the statement of propositions, but holds that they are meaningless when anyone *mentions* them. His theory is a good illustration of the precept that we should always suspect error or eccentricity when a philosopher cries "meaningless!" or "nonsense!"

I shall now suggest an analysis of the token-reflexive expression of an incomplete proposition '"Brutus killed Caesar"'[2] which seems to avoid the difficulties met with by the above three theories. In doing so I shall adopt Professor Reichenbach's distinction between the point or period of time referred to by an utterance and the point or period of time at which the event described took place.[3] The tense structure of sentences in most developed languages cannot be adequately analysed without

[1] He also introduces an additional confusion by apparently using the words "sentence" and "proposition" interchangeably.

[2] These double quotation marks should of course have been used by Mr. Duncan-Jones originally.

[3] *Op. cit.*, p. 288 ff.

making this distinction, because it is only thus that we can distinguish between, say, the past and the perfect, or between the future and the future perfect. And I shall use the present tense in a timeless form. In a preliminary, simplified form the analysans will be :

' " For some *t*, Brutus kills Caesar at *t*, *t* is the point or period of time under reference, and the time under reference is prior to the time at which any member of the following class of tokens is uttered written or thought, *viz*. the class consisting of this and of all other past-referring tokens which would normally be thought to be in direct agreement with it " '. (1)

The analysans (1) expresses an incomplete proposition like its analysandum, because I am mentioning and not using a sentence-type. When this sentence-type is used and not just mentioned, the indeterminate reference (*viz*. " the class consisting of this token and of all other past tense tokens which would normally be thought to be in direct agreement with it ") is determined by the context in which it is used, and thus the proposition asserted *may* be different in different contexts. But it *need not* be different in every context. Whether or not it is different will depend upon customary usage. Thus if, for instance, Plutarch's and Mommsen's translators have in different centuries said " Brutus killed Caesar ", and if they would normally be thought to be agreeing with one another, (1) is intended to elucidate how they would be using that sentence-type to state the same proposition. Moreover, it is also clear, if we apply the criterion of (1), that a man who said " Brutus killed Caesar " or " Brutus Caesarem interfecit " on the day before the Ides of March, 44 B.C., did not assert the same proposition as Plutarch's and Mommsen's translators. We should not normally think they agreed with him. Indeed, it seems to be the case that the proposition which he used the sentence to assert is false, while theirs is true. *Mr. Duncan Jones' paradox arises if we accept an analysis like Professor Moore's which determines the meaning of a token without reference to what would normally be thought to be in agreement or disagreement with it. The paradox disappears when we replace such an analysis by one which includes this reference.*

Of course, sentence-types in the past tense can be used to express the same proposition much more often than those in the present tense. Indeed, it might be argued that in each context in which it is used the sentence-type. " Brutus is killing Caesar " is used to state a different proposition. But I think that this

would be an exaggeration. The analysans for '"Brutus is killing Caesar"' would be:

'"For some t, Brutus kills Caesar at t, t is the time under reference and the time under reference is the same as the time at which any member of the following class of tokens is uttered, written or thought, *viz.* the class consisting of this token and of all other present-referring tokens which would normally be thought to be in direct agreement with it"' (2)

If anyone actually said on that fatal occasion in 44 B.C. "Brutus Caesarem interficit" there may well have been someone else who murmured his agreement a moment later. Accordingly, on the only occasion on which the sentence-type could have been used to state a true proposition the class referred to in the analysans might have had at least two members. However, it does seem impossible to enunciate any precise set of principles which invariably control the composition of such classes. In general, perhaps, the size of these classes seems, in the case of present-tense sentence-types, to vary with the degree of continuity of the event or process described. I doubt if it is possible to say more about them.[1]

I have, of course, considerably simplified my analysis by treating "Brutus kills Caesar" as the expression of a single, simple proposition, in order to bring out the main point at issue. This point remains unaffected if I substitute a more thorough analysis for (1) (and analogously for (2)) in order to cope with awkward sentence-types like '"Napoleon killed Caesar"', '"Alexander killed Caesar"' or '"The gryphons killed the unicorns"':—

'"For some one, and one only, t, x, y, x is Brutus, x kills z at t^a z is y, y is killed at t^b, y is Caesar, t is t^a, t is t^b, t is the time under reference, and the time under reference is prior to the time at which any member of the following class of tokens is uttered, written or thought, *viz.* the class consisting of this token and of all other past-referring tokens which would normally be thought to be in direct agreement with the whole or any significant part of it that includes a token-reflexive specification of time"'. (3)

Against my analysis I can conceive of at least three possible objections:—

i. "Your last analysans (3) shows how absurd is your whole procedure. Instead of clarifying the problem by providing

[1] Cf. *Language Dissertations of the Linguistic Society of America*, No. 21, April–June, 1936, for a thorough treatment of this subject by Mr. O. E. Johnson in *Tense Significance as the Time of the Action*: he too holds (p. 90) that the time referred to by "now" varies in extent according to the material content of "the predicate".

substitute-expressions in ordinary language which are free from paradox you make matters worse by introducing a lot of technical jargon which the ordinary man can hardly be expected to understand". But this would be a silly objection. That hero of philosophical mythology, the ordinary man, requires not the slightest help in his use of sentence-types in a determinate tense. All I have done is to try to make explicit the principles implicit in his usage, in order to help logicians who may be worried by it. I am not recommending the jargon sentence-types (1), (2) and (3) for use instead of their respective analysanda nor claiming that they are so used. I have introduced them only in order to show that neither they nor their analysanda need give rise to paradox. They are, I think, logically equivalent to their respective analysanda, in the sense that, on any occasion on which the sentence-type mentioned in, say, (3) is used to express a complete proposition, this proposition entails and is entailed by the proposition expressed by using the sentence-type " Brutus killed Caesar " on the same occasion. Of course, there are senses of " meaning " in which these two utterances might be taken to have different meanings from one another. In particular, one seems to be *about* Brutus, Caesar and a time of death only, whereas the other is *about* these and also *about* a class of tokens. But an analysans is not illuminating at all if there is not some sense of " meaning " in which it is true to say that it differs in meaning from its analysandum (compare Prof. Moore's famous paradox). The type of analysis which we make varies in accordance with the two senses of "meaning" in which our analysans can truly be said to differ from its analysandum in meaning, and to resemble it in this, respectively. In order to elucidate a paradox in a technical journal we may surely use the type of analysis which is best suited to our purpose, even though there may be other purposes which would be best served by providing an analysans in the form of a substitute-expression in ordinary language.

ii. " The analyses are circular because they presuppose recognition of a class of tokens expressing agreement with one another, whereas the purpose of a good analysis should be to facilitate this recognition for its readers". But the normal subject-matter of analysis consists of sentence-types and their usages (or sometimes of propositional families of sentence-types), not of individual sentence-tokens. Accordingly, the recognition of a class of tokens normally thought to express agreement with one another is a prerequisite of any analysis. Without it we have nothing to analyse. But with it we know at

least some of the contents of the class of tokens referred to in (1), (2) or (3), for instance; so that there is no ground for objecting that these analyses are circular.

iii. "Your analysis is no improvement on the orthodox one, as far as Mr. Duncan-Jones' objection is concerned. The meaning of 'this token' will vary just as much as the meaning of 'now'." But this would be a quibble. On my analysis the class of tokens referred to is always the same for any one proposition although the class is specified by reference to a different one of its members on each occasion that the proposition is uttered. In other words, the proposition is completed in the same sense on each of these occasions, although they are different occasions.

University of St. Andrews.

AMENDING THE VERIFICATION PRINCIPLE

By ROBERT BROWN and JOHN WATLING

RECENTLY,[1] D. J. O'Connor put forward an emended version of the verification principle. He showed that his modification avoided certain difficulties to which A. J. Ayer's statement of the principle was subject. These difficulties have been stated more generally in the following way:

> Of any statement S whatever, either it or its negation is verifiable. Let O_1 O_2 O_3 be three observation statements, such that no one of the three taken alone entails any of the others... Let $\bar{O}_1$ and $\bar{S}$ be the negations of O_1 and S respectively. Then ... $\bar{O}_1$ O_2 v O_3 $\bar{S}$ is directly verifiable, because with O_1 it entails O_3. Moreover, S and $\bar{O}_1$ O_2v O_3 $\bar{S}$ together entail O_2. Therefore (under Ayer's definition) S is indirectly verifiable, unless it happens that O_1 O_2 v O_3 $\bar{S}$ alone entails O_2, in which case $\bar{S}$ and O_3 together entail O_2 so that $\bar{S}$ is directly verifiable.[2]

These reasons do not show that O'Connor's version allows of any statement S whatever that either it or its negation is verifiable. For O'Connor's version stipulates that for a molecular statement to be directly verifiable all of its components must be either analytic or observation statements. One of the components of $\bar{O}_1$ O_2 v O_3 $\bar{S}$ is $\bar{S}$, and as the verifiability of S or $\bar{S}$ is in

[1] ANALYSIS, Vol. 10, pp. 67–72.
[2] A. Church, *The Journal of Symbolic Logic*. Vol. 14, 1949, p. 53.

question it cannot be assumed that either of them is either analytic or an observation statement. Therefore, it does not follow that $\bar{O}_1\ O_2\ v\ O_3\ \bar{S}$ is directly verifiable, nor that S is indirectly verifiable. That S is sometimes directly verifiable is no objection to the principle.

Neither is the principle open to the criticism that it admits any statement S or its denial so long as S is not a truth-functional compound.[1] For the validity of the above against the previous objection is unaffected whether S is a truth-functional compound or not.

But it is open to the objection that it denies meaning to many ordinary statements, namely those having no significance independently of certain other statements. We verify such dependent statements by verifying compound statements in which they occur and not merely by conjoining them with independently verified statements. Since, on O'Connor's principle, the verification of the compound statements requires the separate verification of each component, we cannot verify dependent statements simply by verifying their compounds. For example, the verification of " There is an electric current of one amp in this wire " might require the verification of its conjunction with " This wire has a resistance of one ohm ". Again, we might wish to verify " There is a sycamore tree in the garden" by verifying its conjunction with the law " Trees have no power of self propulsion ". This conjunction makes probable the statement " If I go into the garden tomorrow I shall see a sycamore tree ".

In order to make statements of this kind significant and yet avoid the previous objections we shall have to replace the requirement that a molecular statement should contain only components which are either observation statements or analytic. We suggest the following condition : If the statement is molecular then it must not contain any component whose deletion leaves a statement which entails verifiable statements not entailed by the original statement, or does not entail verifiable statements entailed by the original statement.

This condition is not open to the objection that it allows any statement whatever, or its negation, to be verifiable. $\bar{O}_1\ O_2\ v\ O_3\ \bar{S}$ is not directly verifiable for any S, even though with O_1 it entails O_3 When S is a meaningless statement, for example " The Absolute is lazy", $\bar{O}_1\ O_2 v\ O_3$ with O_1 entails O_3. Hence, $\bar{O}_1\ O_2 v\ O_3$

[1] C. G. Hempel, *The Journal of Symbolic Logic*, Vol. 15, 1950, p. 216.

$\bar{S}$ is excluded from direct verifiability by the suggested condition. Therefore S will not be indirectly verifiable.

There is one other respect in which O'Connor's alteration is too severe. He requires that for a statement to be indirectly verifiable it should not be directly verifiable. But whereas we wish to distinguish between direct and indirect verification, this is no reason for dividing statements themselves into these two exclusive classes. Any statement must be verifiable by at least one of the two methods, and some statements may be verifiable by both.

With these amendments the complete verification principle will read :

A statement is directly verifiable if it is (1) either itself an observation statement or (2) satisfies the following conditions : first, that in conjunction with one or more observation statements it entails at least one observation statement which is not deducible from these other premises alone ; and, secondly, that if it is a molecular statement then it must not contain any component whose deletion leaves a statement which entails verifiable statements not entailed by the original statement, or does not entail verifiable statements entailed by the original statement.

A statement is indirectly verifiable if it satisfies the following conditions (1), that in conjunction with certain other statements it entails one or more directly verifiable statements which are not deducible from these other premises alone ; (2) that these other premises do not contain any statement which is not either analytic or directly verifiable or capable of being independently established as indirectly verifiable ; and (3) that if it is a molecular statement then it must not contain any component whose deletion leaves a statement which entails verifiable statements not entailed by the original statement, or does not entail verifiable statements entailed by the original statement.

University College, London.